

ALTERNATIVES TO KJELDAHL DIGESTION FOR DETERMINATION OF TOTAL AND PARTICULATE NITROGEN IN WATER

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Biographical Sketch of Authors

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Abstract

Kjeldahl digestion methods for nitrogen and phosphorus determinations in filtered and whole-water samples are widely used for water-quality assessment. Although these methods are robust and amenable to automation, they suffer from drawbacks that include—

- Potential health and safety risks, such as concentrated sulfuric acid, mercury (II), high operation temperatures.
- Environmental impact and costs associated with mercury (II) waste disposal.
- Propensity of acidic digests to become contaminated by ambient ammonia vapors.
- Relatively high method detection limits (≥ 0.1 mg-N/L) for nitrogen.

Alkaline persulfate digestion methods, which oxidize organic nitrogen and phosphorus compounds to nitrate and orthophosphate at elevated temperature and pressure, overcome many of the inherent limitations and liabilities of Kjeldahl digestion methods. For example, the lower blanks typical of alkaline persulfate digestion methods substantially improve method detection limits and precision of analytical results relative to Kjeldahl digestion methods. Nitrogen and phosphorus concentrations determined in synthetic solutions and natural-water samples after Kjeldahl and alkaline persulfate digestion are presented and discussed. Arguments are presented in favor of quickly adding alkaline persulfate digestion procedures for nitrogen and phosphorus determinations to the list of approved methods for Safe Drinking Water Act and National Pollution Discharge Elimination System monitoring.